

Myelography

Diagnostic Value in Lesions of the Lumbar Intervertebral Discs with a Variation in Technique

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SUMMARY

Myelography using pantopaque in greater than usual amount with a variation in technique, which is described, is believed to provide increased accuracy in differential diagnosis and precise localization of lesions in the lumbar spine. The need for multiple space exploration is eliminated and more detailed information concerning the size and shape of lesions is provided as compared to that secured by the use of 3 or 6 cc. of opaque medium and fluoroscopic examination alone.

In 53 cases in which lumbar myelography was performed and the diagnosis verified or disproved at operation, there was a 5 per cent diagnostic error in 41 instances in which the method outlined was used, as compared with 17 per cent error in 12 cases in which only 3 or 6 cc. of radiopaque material and fluoroscopy alone were used. The accuracy of the procedure would appear to warrant its use in the evaluation of patients suspected of having abnormalities of the lumbar discs associated with nerve root compression.

THERE still appears to be a sharp difference of opinion concerning the value of myelography, employing the radiopaque medium, as a diagnostic adjunct in the examination of suspected lesions of the lumbar intervertebral discs. In 1941 Dandy⁵ strongly urged that the use of contrast media be eliminated. Gillespie⁸ expressed the opinion that myelography is unnecessary. A recent article by Arismendi² concluded that opaque myelography yields less than a 50 per cent accuracy of diagnosis. Other observers,^{1, 7, 9, 12, 13, 14} however, regard the procedure as of considerable value. The authors use pantopaque as a diagnostic agent in all instances in which neural compression from herniation of an intervertebral disc is suspected.

In studies of the lumbar region, previous experience with pantopaque, as well as with lipiodol, led

to a feeling of dissatisfaction with the examination as then performed, using 3 or 6 cc.^{4, 6, 15} of the medium and fluoroscopic examination with the patient on the tilting table (Figure 1). The oil is confined to the anterior concavity or channel of the dural sac by this technique. Thus, with the patient in the prone position, the material does not extend to the widest part of the intrathecal lumen at all times. The sheaths of the nerve roots usually are not well filled so that lateral herniations of intervertebral discs more readily may escape detection. Since films usually are made with the patient in the prone position only, an inadequate perspective of any demonstrated abnormality is obtained. If the patient is turned from the prone to the oblique position¹⁵ in order to allow the oil to settle in the anterolateral portion of the intrathecal lumen, those

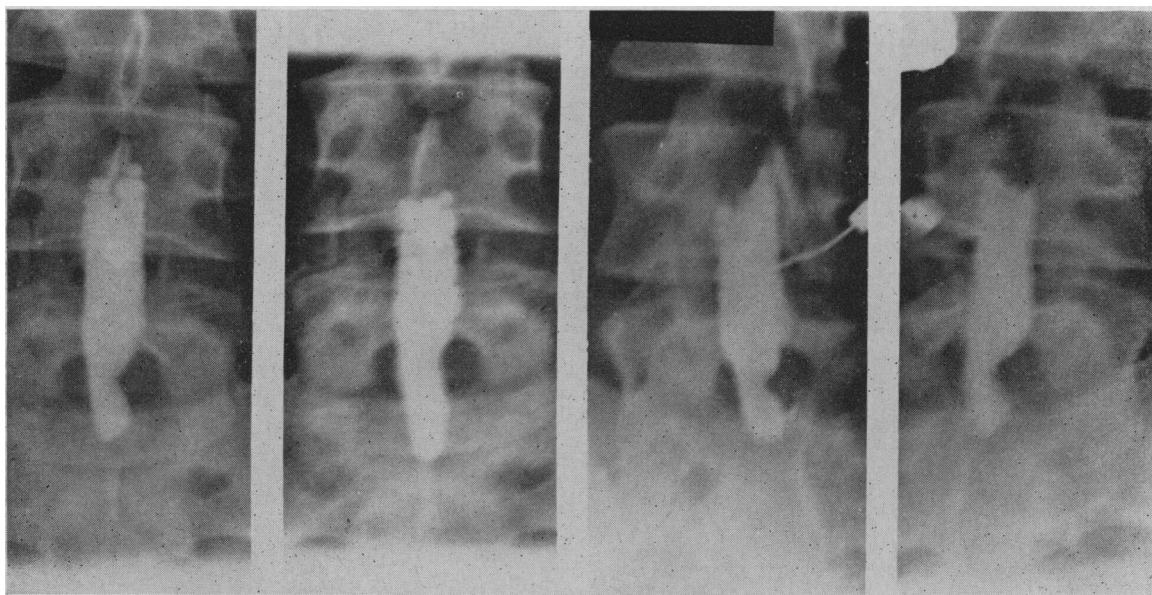


Figure 1.—Fluorographic appearance of a herniated disc at the lumbosacral interspace on the left with 3 cc. of pantopaque.

nerve root sheaths which then are filled are also obscured by the overlying lake of oil, and those which are swung into relief are emptied of oil and therefore not visible. Minor alterations in the contour of the anterior wall of the intraspinal canal may give rise to exaggerated defects (Figures 2 and 3) seen by myelography. The interpretation of these defects is often difficult and occasionally the source of diagnostic error. However, by employing a larger amount of oil for examination of the lumbar region and by using four projections with the patient standing, many of these apparent deficiencies may be overcome. The modification described in the following paragraph has been used by the authors with increasing frequency, and at times the procedure

has been used as an instrument of investigation in some patients who complained of persistent pain only in the lower part of the back.

With the patient in a lateral decubitus position, using a 19 gauge needle, a lumbar puncture is performed at the fourth or fifth interspace, selecting the space believed uninvolved. Multiple needle punctures at the time of injection appear to invite extravasation of oil. A quantity of cerebrospinal fluid is removed equal to that of the pantopaque injected. The contents of four ampules of pantopaque¹⁶ (approximately 13 cc.) is injected and four roentgeno-

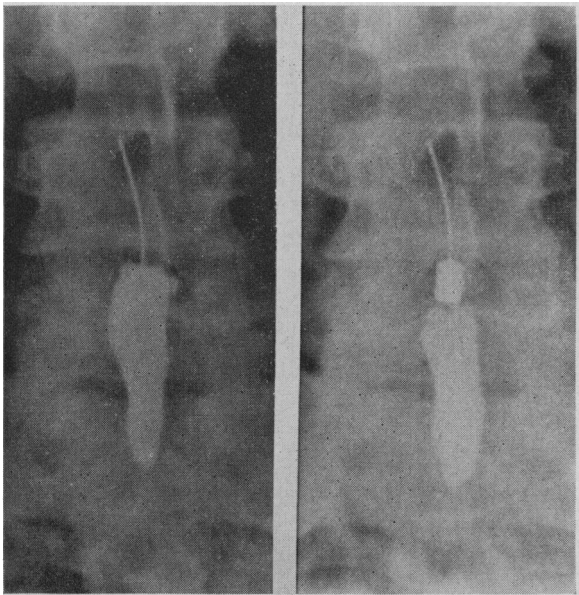


Figure 2.—Persistent defect at lumbosacral interspace misinterpreted as herniated disc (cf. Figure 1).



Figure 3.—Unilateral exaggerated defect shown with 3 cc. of pantopaque radiologically misinterpreted.

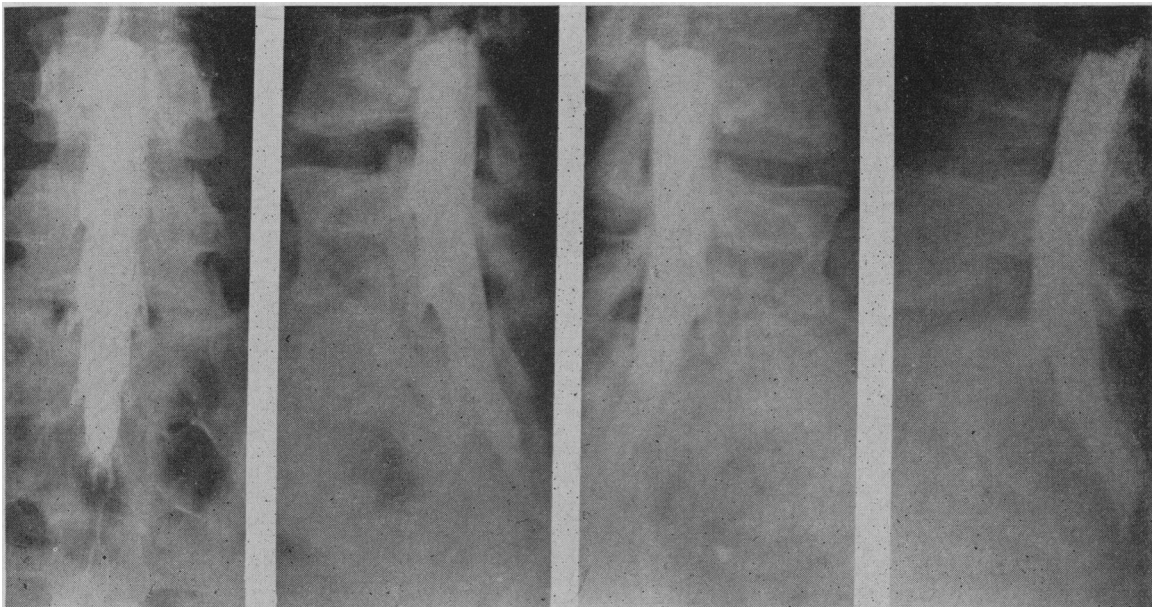


Figure 4.—Average normal sagittal, oblique and lateral projections with 13 cc. of oil.

grams taken using horizontal projections with the patient standing. The four projections (Figure 4) include a postero-anterior, a lateral and two 45-degree obliques. After the roentgenograms have been examined, if no additional views are desired, the procedure customarily has been supplemented by fluoroscopy with the patient on the tilting table. When the examination is completed the oil is withdrawn^{11, 14} and the needle removed. The patient is then instructed to remain horizontal for 24 hours. The use of this amount of pantopaque does not appear to be harmful.

This modification of the method of examination appears to overcome the deficiencies¹⁰ previously indicated. Irregularities in the anterior por-

tion of the spinal canal, inconstantly observed and of variable appearance at fluoroscopic examination, present a less confusing picture when outlined (Figure 5) by the greater amount of oil. The full extent of larger defects (Figure 6) is visible by the four projections and a three-dimensional concept of the lesion is gained. Two to five segments of the lumbar area are visualized for comparison (Figures 7, 8, 9, 10) on the same film. The distal thecal sac is fully outlined (Figure 11) in the standing position,¹⁰ as compared to the partial outline of an incompletely filled sac in the prone position. The filling of the lower lumbar and upper sacral nerve root cuffs is greater by this method and the oblique projections bring them into maximum silhouette perpendicular

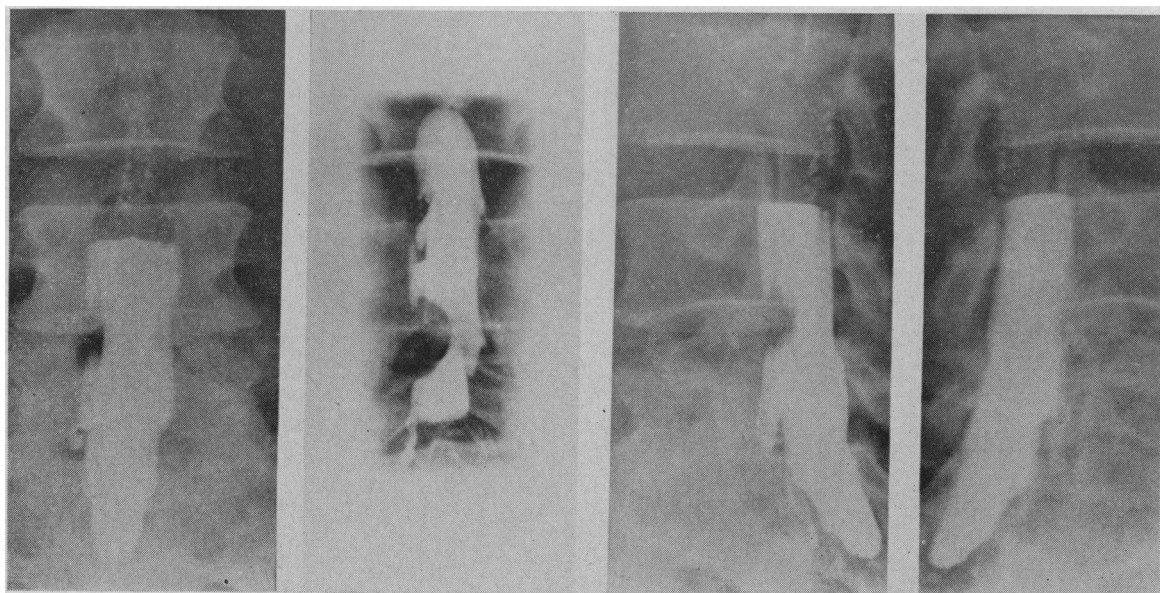


Figure 5.—Disc herniation at the fourth lumbar interspace on the right. Comparison fluorogram with the patient prone and 6 cc. of oil exaggerates the defect and gives incomplete information (cf. Fig. 3).

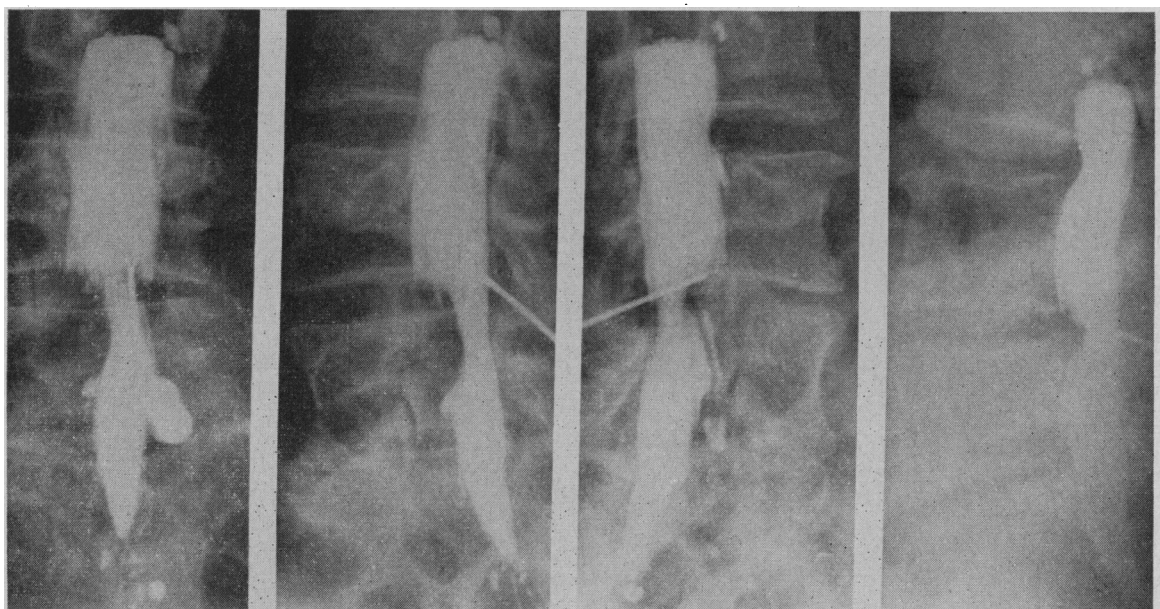


Figure 6.—Complete prolapse of the disc over the fifth lumbar body. Fourth interspace narrowed.

to the direction of the roentgen beam. The overlying column of oil does not obscure the root cuffs in the oblique views. Small lateral herniations may be identified (Figures 12 and 13). Droplet formation is avoided.

In certain instances (Figure 14), herniations of intervertebral discs may be demonstrated to better advantage by utilizing a thin lake¹⁵ of oil than by filling the whole lower subarachnoid space. Hence the need for fluoroscopic examination with the patient on the tilting table after roentgenograms are taken with the patient standing. The two meth-

ods are considered supplementary and one is not used to the exclusion of the other.

There are patients who present signs and symptoms implicating one of the lumbosacral nerve roots in whom myelography discloses a defect not characteristic of a herniated disc, but rather a ridge-like deformity of the anterior portion of the radiopaque column. The variable appearance of this defect (Figure 15) can be demonstrated by careful maneuvers^{3, 15} with the smaller amounts of oil. The larger amount of oil defines this abnormality more clearly (Figures 16 and 17).

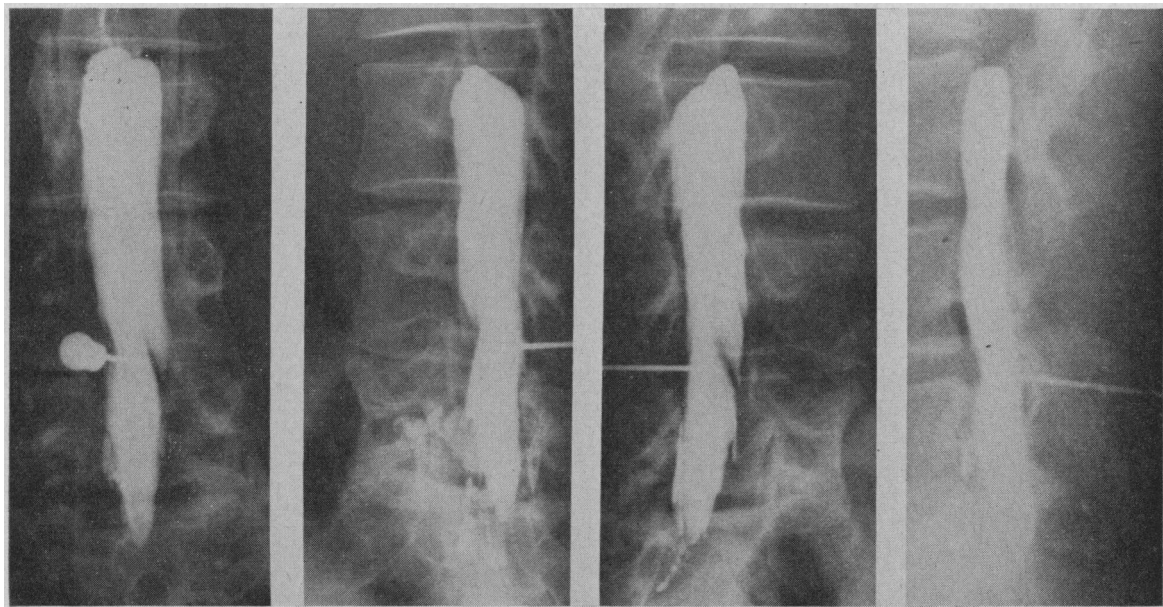


Figure 7.—Disc herniation at the right fourth interspace showing shallow indentation, easily identified by the visualization of a long segment of the canal. Note compression sufficient to reveal adjacent nerves of cauda equina which are rarely visible with smaller amounts of oil.

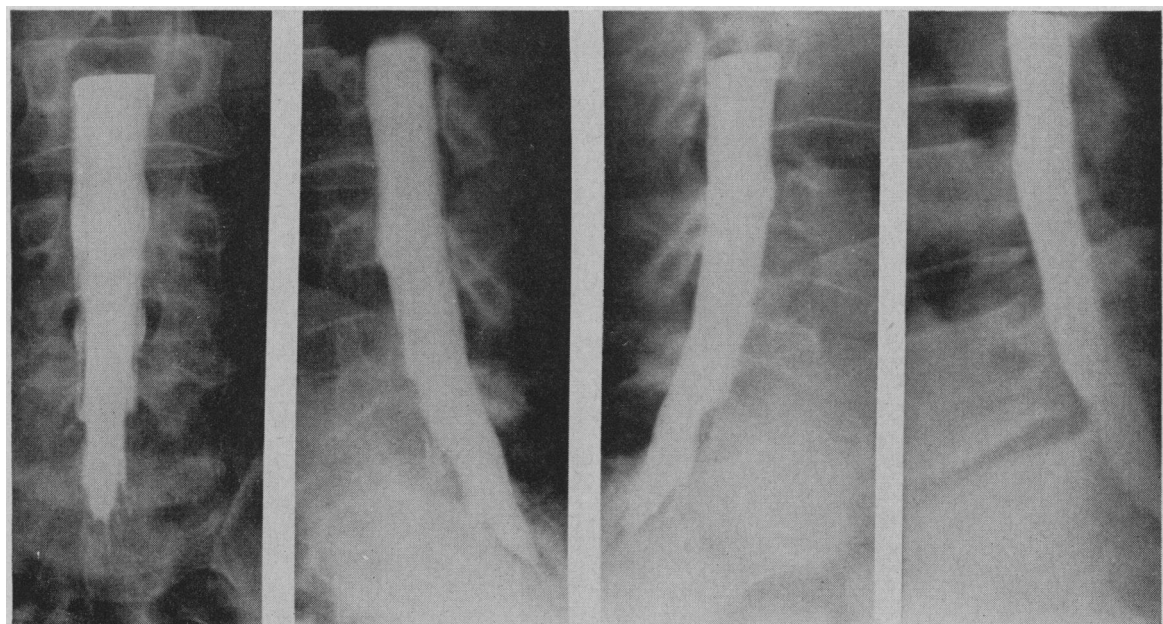


Figure 8.—Small herniation at the lumbosacral interspace on the left suggested by the shortening of the root cuff. Oblique projection diagnostic.

Decompression of the affected nerve root or roots may relieve the symptoms. As it is not the intention to enter into a discussion of the pathologic aspects of the condition, the descriptive term "ridge defect" is used here to designate the radiographic appearance of the abnormality as observed at myelography. The authors are avoiding the use of such controversial terms as "concealed discs," "retropulsions," "protruded discs," and "hypertrophy of the ligamentum flavum." Nevertheless, the defect usually may be distinguished radiologically from the myelographic picture produced by a herniated disc.

One hundred and nineteen consecutive myelograms have been done by one or both of the authors

in the past 18 months. Of this number there were 72 in which an abnormality was detected in the lumbar region. The diagnosis was verified or disproved by operation in 53 instances. Considering only this last group of 53 patients the following pre-operative diagnoses were made:

Herniated disc 44

Ridge defect..... 10

There were four error in diagnosis.* Of these, there were two errors (17 per cent) of interpreta-

*A herniated disc was found in one of the patients operated upon elsewhere. This does not change the authors' statistics, but does indicate the expected probability of diagnostic error in a negative sense, as Arismendi showed in the group of patients operated upon despite negative results of fluoroscopic examination.

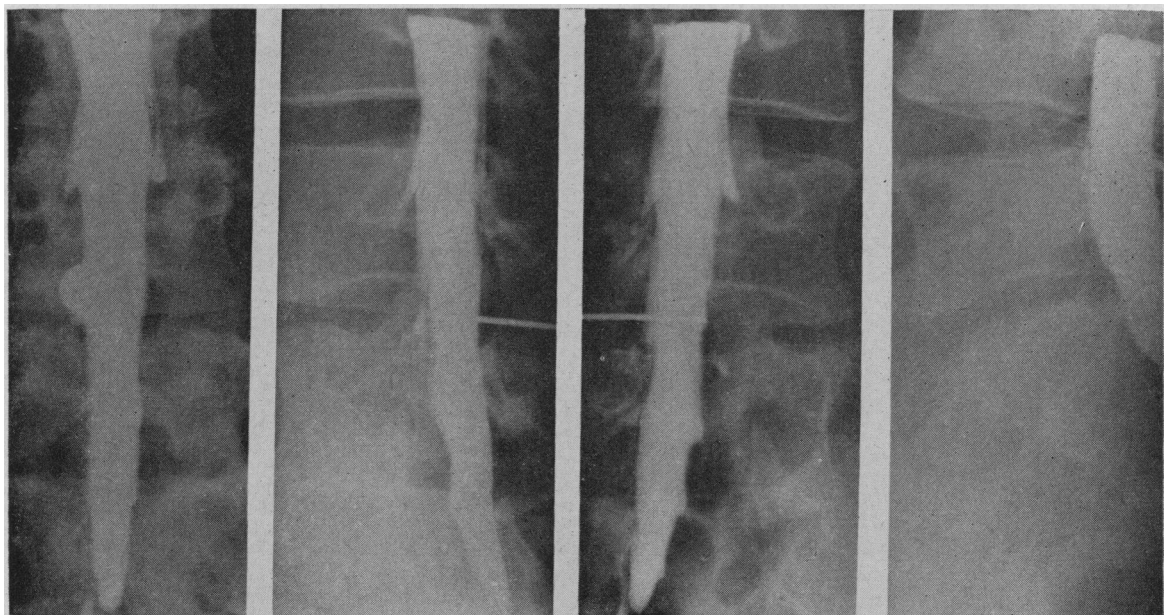


Figure 9.—Disc herniation at the lumbosacral interspace on the right shown only in the oblique projection.

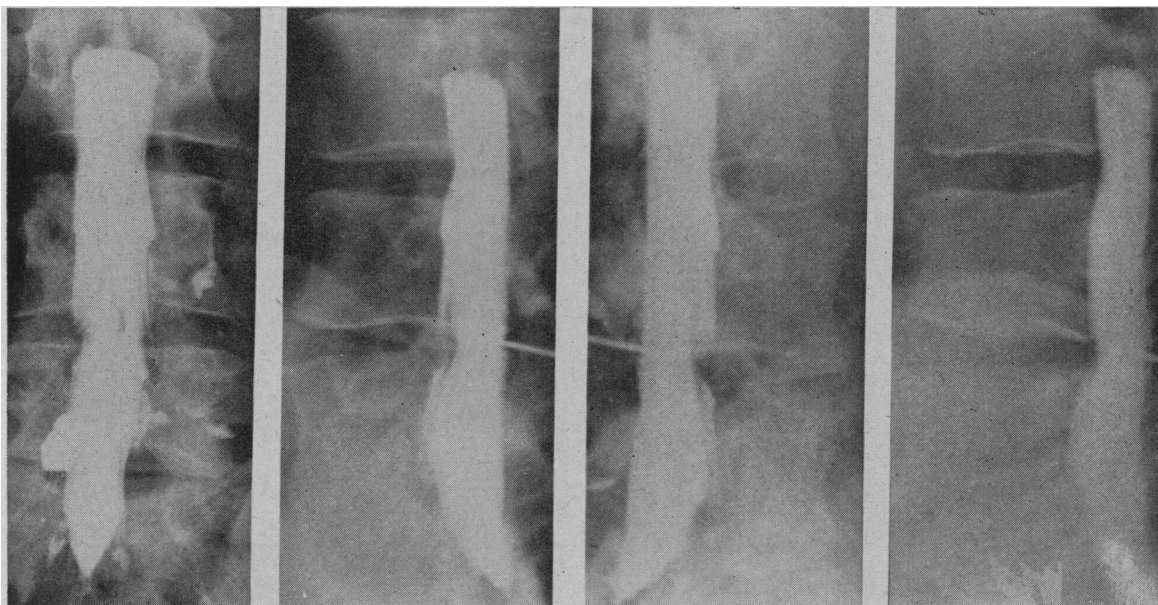


Figure 10.—Disc herniation at the lumbosacral interspace on the left shown only by the gross displacement of the pantopaque column. Note the symmetrical asymptomatic deformity at the fourth interspace.

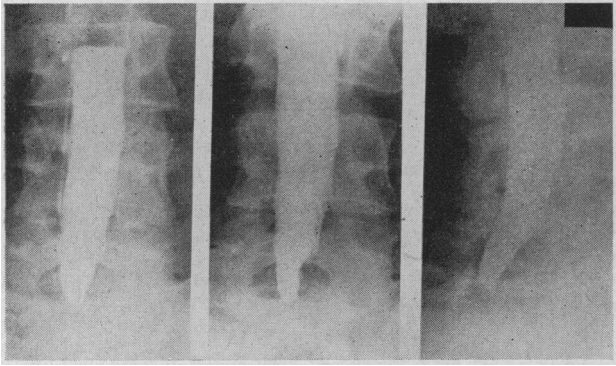


Figure 11.—Disc herniation at the lumbosacral interspace on the left with more rostral termination of the dura. Shown in erect and prone sagittal and oblique projections respectively. Obviously a small amount of oil would have been sufficient in this instance.

tion in 13 myelograms using 3 or 6 cc. of pantopaque. There were two errors (5 per cent) in 41 myelograms, using 12 or more cc. of pantopaque. One error was made the first time the larger quantity of oil was used. In the second error, subsequent events showed that an appearance interpreted as a herniated disc was due to failure of filling of the nerve root cuff caused by edematous swelling of the nerve secondary to pressure of a ridge defect at the interspace above. In both instances there was disagreement between the authors as to the diagnosis.

ACKNOWLEDGMENT

To Ralph S. Graham, M.D., department of radiology, Sutter General Hospital, Sacramento, California, where the majority of the work was done.

To Orrin S. Cook, Mercy Hospital, Sacramento, California, for making available additional roentgenograms for review.

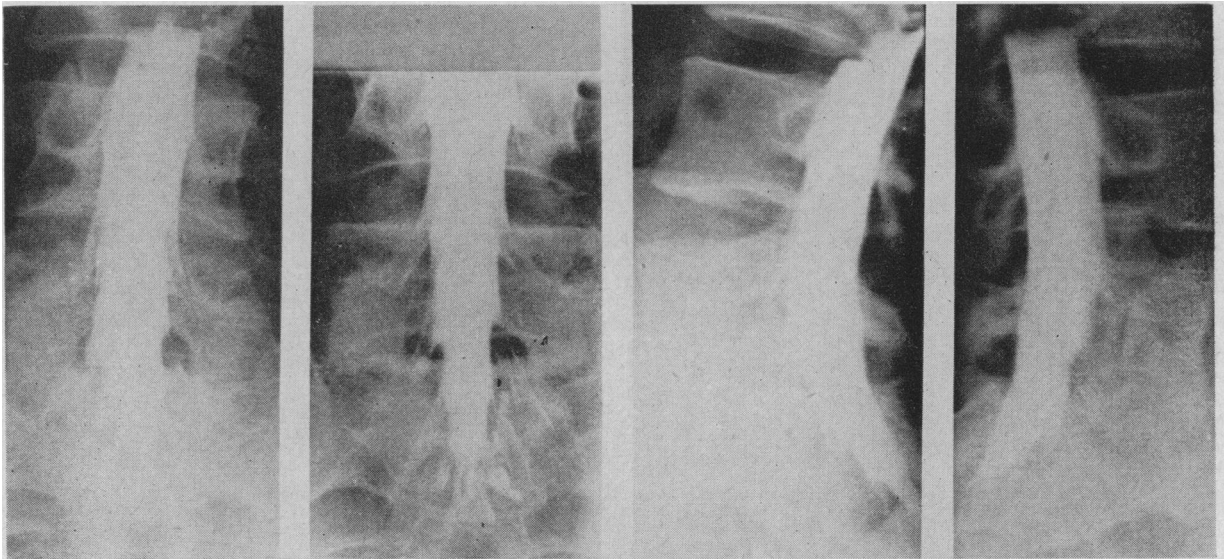


Figure 12.—Small lateral herniation at the lumbosacral interspace on the left clearly outlined by localized root compression. Prone fluorogram shows less complete filling of dural sac but root cuffs have already been filled with the patient erect.

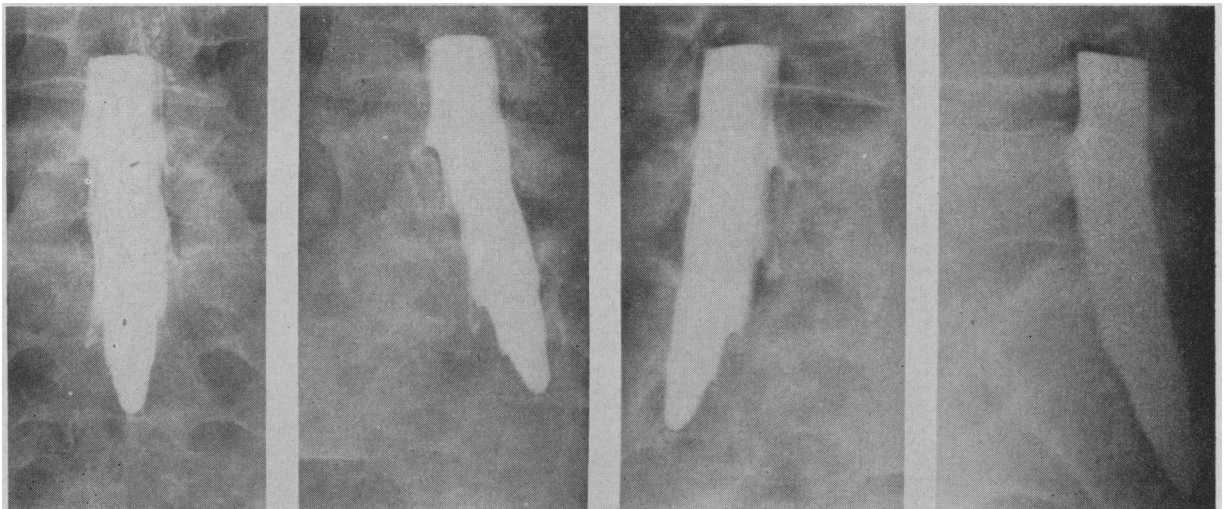


Figure 13.—Lateral herniation at the lumbosacral interspace on the right. Identified only by lack of filling of nerve root cuff and by measurable difference in oblique diameters of pantopaque column.

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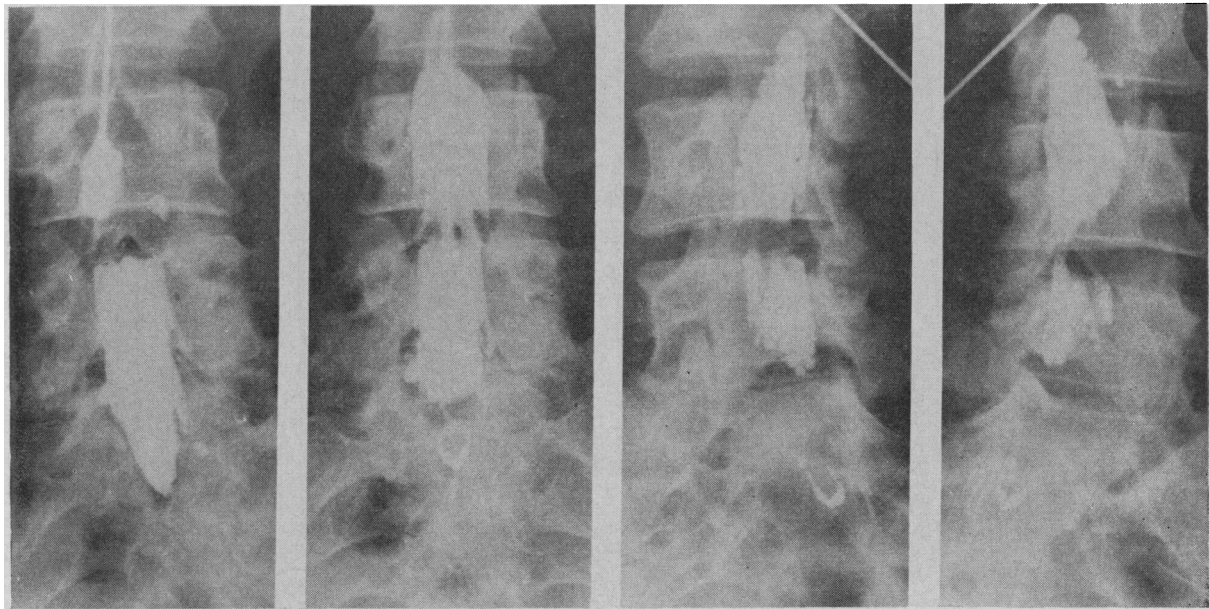


Figure 14.—Centrally placed herniation at the fourth interspace with insufficient pantopaque (6 cc.) to study the area of abnormality with the patient erect. Well shown on fluorogram with patient prone and poorly outlined in oblique projections. This is one of the early cases before using the greatest amounts of pantopaque.

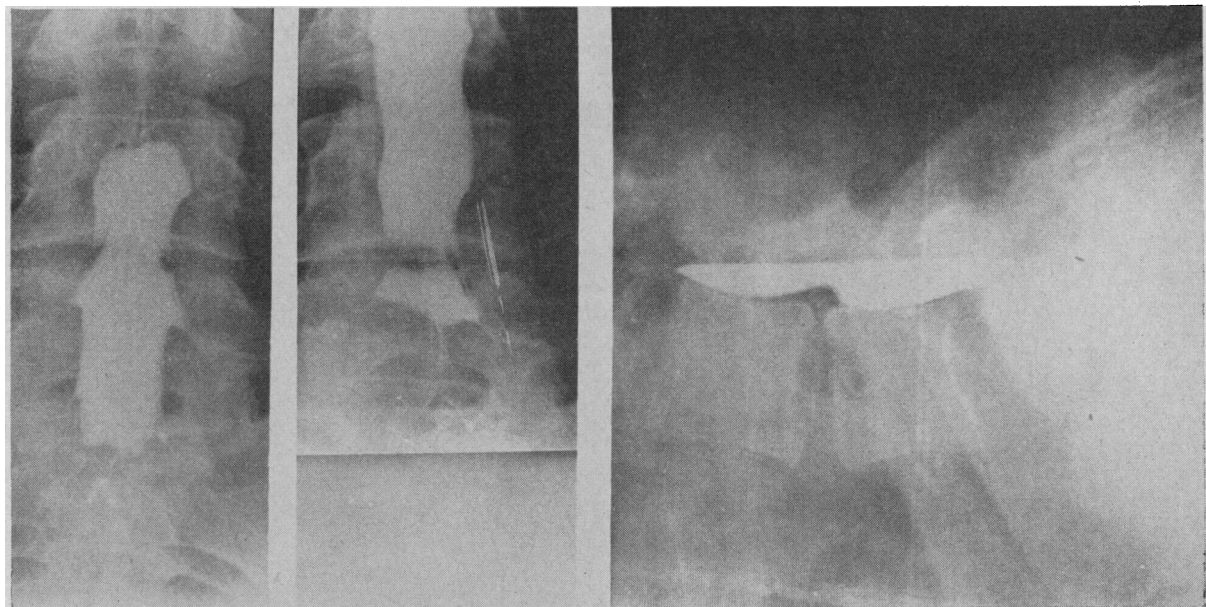


Figure 15.—Variable appearance and incomplete delineation of a narrow "ridge defect" shown on fluorogram and lateral roentgenogram.

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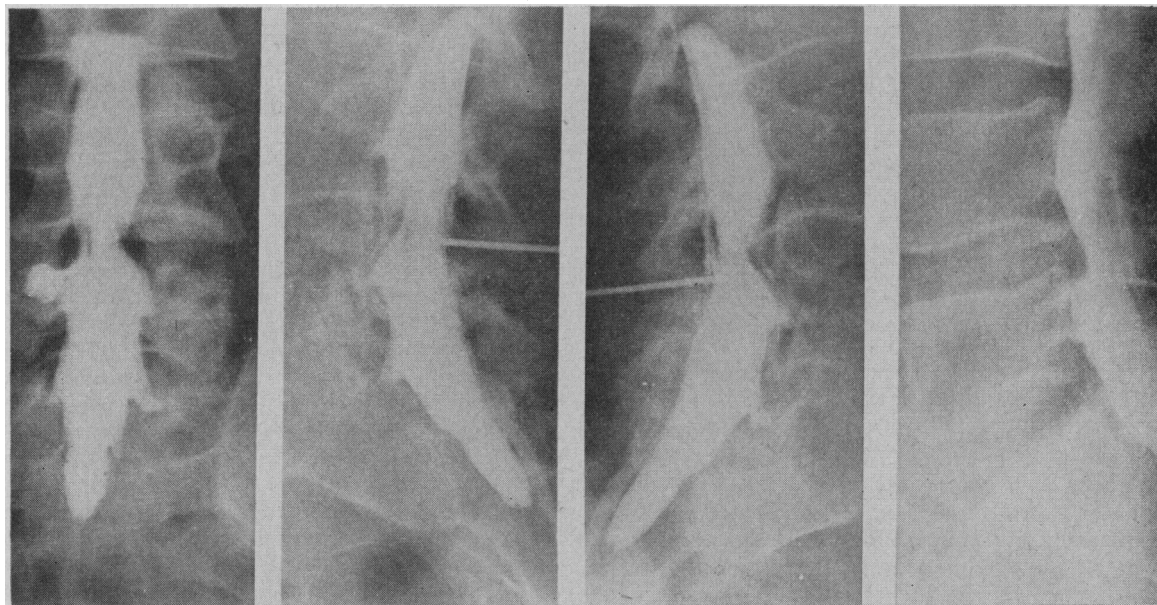


Figure 16.—Large anterior and lateral symmetrical deformity at the fourth interspace, obviously as prominent as many disc herniations.

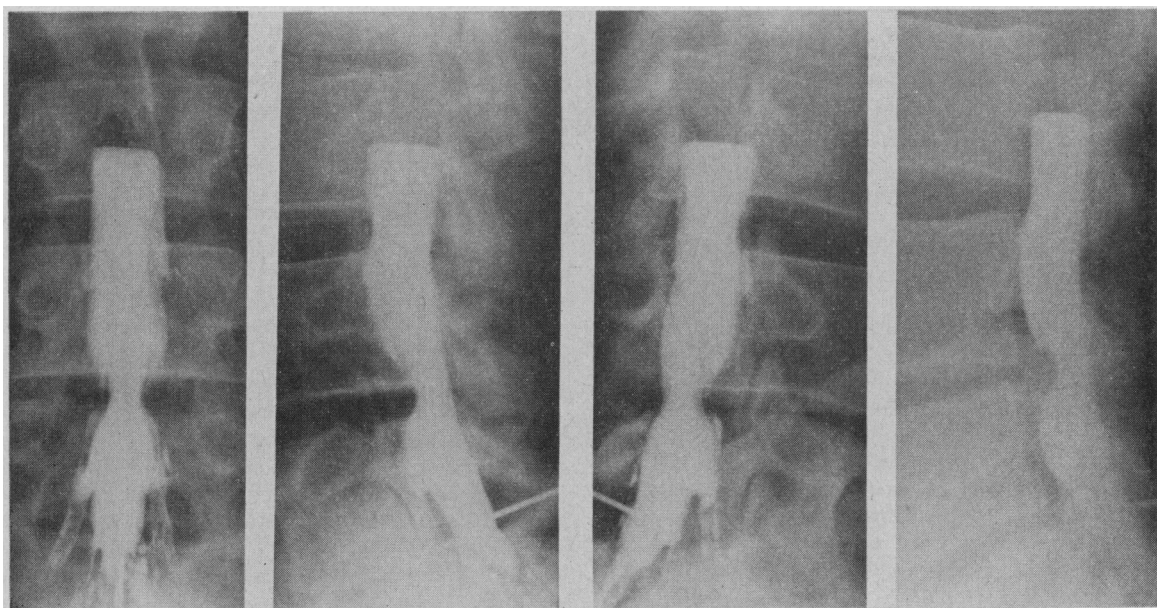


Figure 17.—Symmetrical constriction at the fourth interspace by "ridge defect." Note central and dorsal displacement of the visible nerves of the cauda equina by the localized prominence. This type of abnormality has not been encountered at the lumbosacral interspace.